

Version 2.0



Abstract

[Back to Hit List](#)

Grant Number: 1R01DC005036-01

PI Name: VOSSHALL, LESLIE B.

PI Email: vosshall@rockvax.rockefeller.edu

PI Title:

Project Title: Formation of an Olfactory Sensory Map

Abstract: The long term goals of this proposal are to understand the molecular and cellular mechanisms that generate the precise connectivity of neurons in the brain. The olfactory system provides an excellent model for axon guidance because a large number of functionally distinct neurons must be wired appropriately for the brain to perceive and discriminate odors. Experiments will be carried out in the fruit fly, *Drosophila melanogaster*, which has a functionally sophisticated but anatomically simple olfactory system. The availability of the complete genome sequence of this model genetic organism makes it possible to study olfaction at the level of genes, molecules, neurons, and behavior. Approximately 1300 olfactory neurons are wired to 43 olfactory glomeruli in the brain, generating an olfactory sensory map. Odorant recognition is likely to be mediated by a large family of novel odorant receptor genes, which encode 60 different seven transmembrane domain G protein-coupled receptors. In preliminary studies, the P.I. has genetically labeled all neurons expressing a given receptor and demonstrated that axons from these neurons converge with precision to one or two glomeruli in the brain. These studies have led to the hypothesis that functional properties of the olfactory neuron itself are determinants in target selection in the brain. To test this hypothesis, the following specific aims are proposed: (1) Developmental analysis of olfactory axon guidance. (2) Role of the larval antennal nerve as a pioneer fiber in adult olfactory axon guidance. (3) Contribution of the odorant receptor protein to target recognition. (4) Influence of synaptic activity on the formation of the olfactory map. A genetic approach will be used to trace olfactory axon projections in developing animals, in animals whose larval olfactory neurons have been conditionally ablated, and in which neurons expressing a given receptor misexpress a second odorant receptor or a cell- autonomous blocker of synaptic activity. The health relatedness of these studies is that cellular and molecular factors that regulate axonal pathfinding may have direct application to neurological and psychiatric disorders with a developmental basis.

Thesaurus Terms:

arthropod genetics, developmental genetics, developmental neurobiology, limbic system, neurogenetics, neuronal guidance
axon, biological model, cell component structure /function, genetic model, olfaction,

olfactory nerve, receptor expression, sensory receptor, synapse
Drosophilidae, genetic technique, transgenic animal

Institution: ROCKEFELLER UNIVERSITY
66TH AND YORK AVE
NEW YORK, NY 10021

Fiscal Year: 2001

Department: LAB/NEUROGENETICS/BEHAVIOR

Project Start: 01-AUG-2001

Project End: 31-JUL-2006

ICD: NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION
DISORDERS

IRG: IFCN

